Methods for Preserving Audiovisual Data

Cooperatively Utilizing Digital Fingerprints & Watermarks

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Michael Wise
Group Technical Advisor, Platform R&D
Turner Broadcasting System, Inc.
Michael.Wise@Turner.com

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Overview

- Despite the proliferation of video on the Web, the availability of quality, consistent metadata remains elusive
  - Standards, related implementation issues cause inconsistency
  - Syndication and the repurposing of traditional linear content feeds for the Web complicates metadata survivability
  - Transcoding, transcrypting, and substitution of container formats can all affect metadata integrity and survivability
  - A significant amount of content is (re)published by publishers unaffiliated with content owners or distributors causes metadata unpredictability
- Lack of quality metadata has several consequences
  - Suboptimal search results
  - Complicates enforcement of usage rights
  - Affects ability to reliably measure and monetize content usage
- Digital watermarking and fingerprinting can help maintain metadata integrity through production, distribution, and consumption chains

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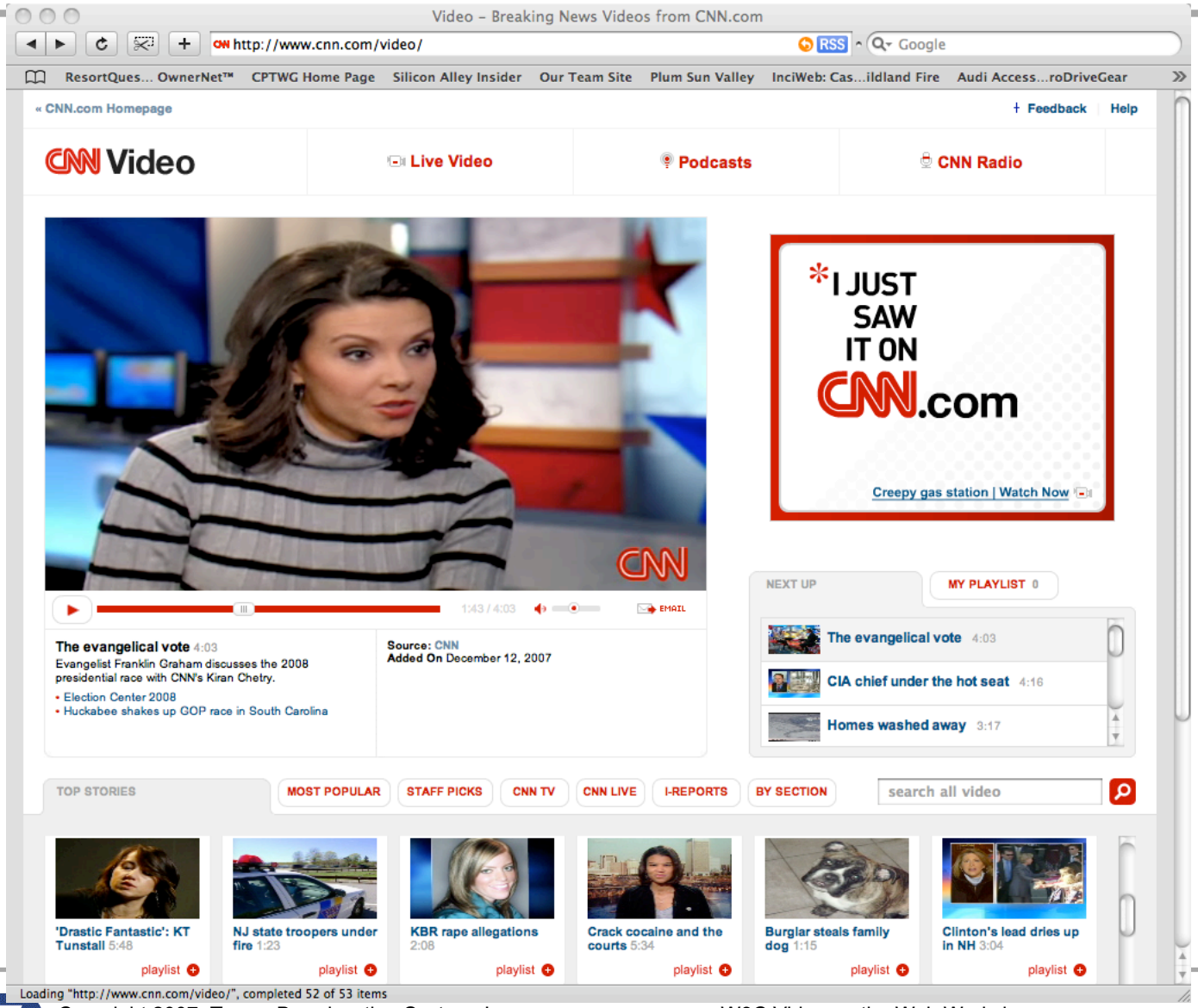
CNN.com Hosted Video: Rich, Accurate Metadata



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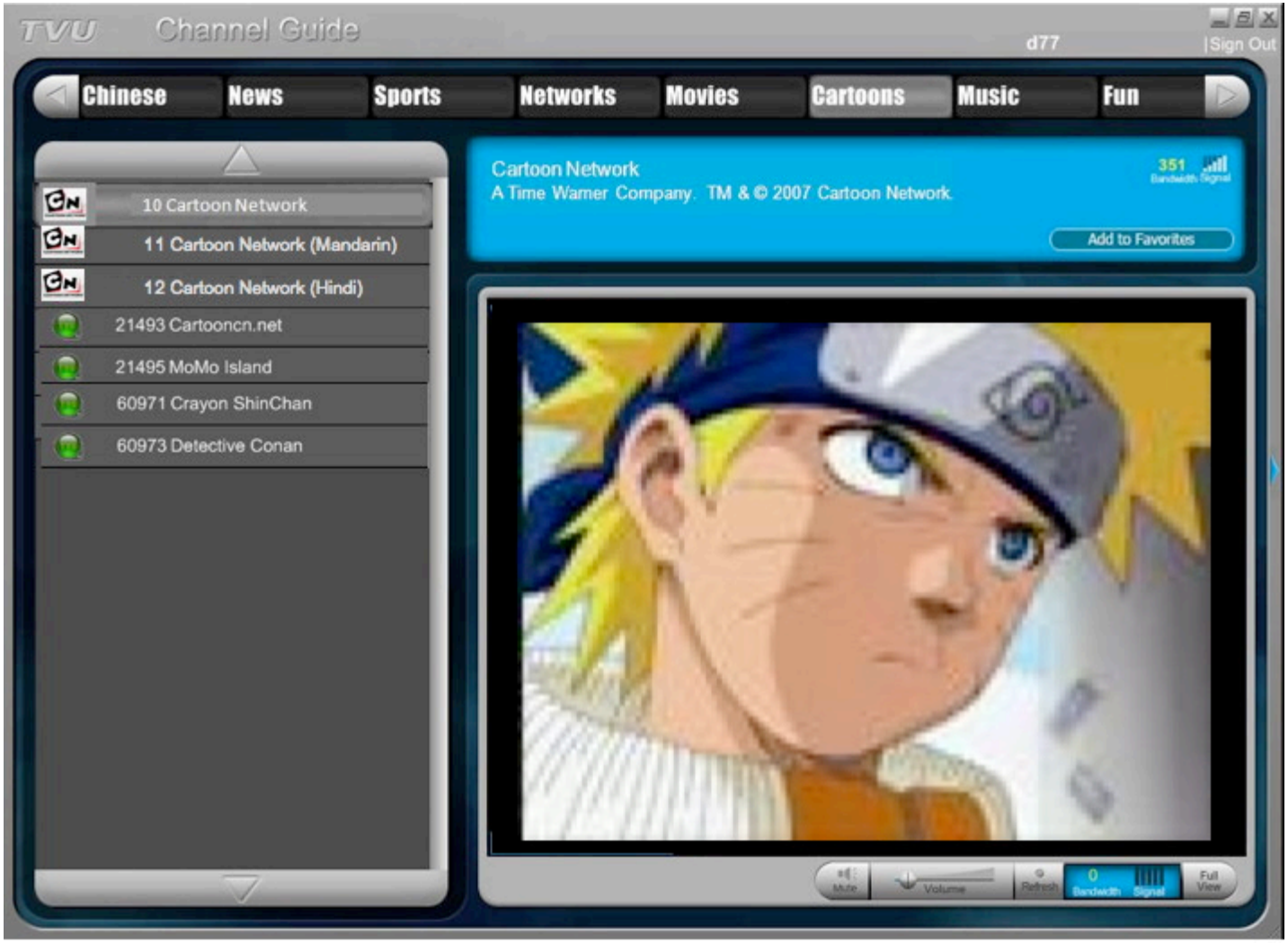
Syndicated Linear Video: Less Metadata



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User Re-encoded Linear Content on the Web: Potentially Unpredictable Metadata

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Digital Watermarks and Fingerprints Defined

- Digital Watermarking technologies enable the addition of a hidden message to an audiovisual file
  - Current digital watermarking technologies have the ability to survive common transformations such as re-encoding, sub–sampling, and cropping of the original media files
  - There are tradeoffs and relationships between watermark transparency, recoverability, survivability, and payload size
  - Practical payload sizes are typically 3-10 bits/second
  - Many vendors

- Digital Fingerprinting is the calculation of a unique “fingerprint” of a segment of content
  - A segment is identified by calculating a fingerprint of the content and performing a comparison against a database of known fingerprints
  - Many vendors

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Possible Applications of Digital Watermarks and Fingerprints

- Possible uses of these technologies are many. Examples include:
  - Facilitation of usage measurement through the embedding of a unique ID analogous to a UPC code
  - Assistance in the enforcement of various usage rules through the embedding of usage flags
  - Identifying when and where an asset transited various distribution points through the embedding of forensic watermarks
- Improved monetization opportunities could be possible

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Challenges in Broadly Implementing Digital Watermark Technologies

- Effective digital watermark payload sizes are small relative to ideal metadata payloads
- Unpredictable results occur when multiple watermark technologies are applied to a content segment
- Fingerprinting can augment efforts to identify content, but
  - Can be computationally more expensive than watermark detection
  - Doesn't enable certain metadata to be "self identifying"

Technical constraints will likely require industry cooperation to meaningfully leverage digital watermark and fingerprint technologies to preserve metadata

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